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HISTORY OF THE PINK BOLLWORM WORK IN THE UNITED STATES

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Lower Rio Grande Valley

The lower Rio Grande Valley district of Texas includes the counties of Cameron, Hidalgo, Starr and Willacy. The cotton crop is produced much earlier than in any other part of the Cotton Belt. Planting is usually done the latter part of January and in February, with picking and ginning beginning the latter part of June and being largely completed by the end of August. This district has been considered more or less exposed to infestation, and inspections have been carried on each year since the discovery of the pink bollworm in the United States.

The first infestation was found in gin trash at Matamoros, Mexico, just across the river from Brownsville, Tex. on August 6, 1936. Specimens of the pink bollworm were found in the first sample of trash examined and were found almost daily thereafter in trash from all gins in the Matamoros section until inspections were discontinued. A total of 235 pink bollworm larvae were submitted for identification in addition to some 25 larvae which were turned over to Mexican agricultural inspectors at their request. At Reynosa, Mexico, about 50 miles up the river from Matamoros, 8 specimens were found, these being the only two points on the Mexican side at which gins were operating. Immediately following the first finding at Matamoros, gin-trash machines were sent to the valley to begin work on the Texas side. They began operating on August 10, and on the following day the first specimen of the pink bollworm was found at Brownsville, with 3 additional specimens being found within the next few days. On August 12 the first specimen was found at San Benito and when inspections had been completed 19 specimens had been found at that location, but later in the season additional specimens were found by regulatory inspectors. The only other finding in the valley was at Rio Grande City in Starr County, where 1 larva was found on August 15.

On August 17, 1936, Quarantine 52 was amended to add the Counties of Cameron, Hidalgo, Starr and Willacy to the lightly infested area. Although no specimens were found in Hidalgo and Willacy Counties it was necessary to include them as seed cotton is moved throughout the area for ginning regardless of county lines. Approximately 250,000 acres of cotton were involved in the four counties.

When the area was brought under regulation most of the cotton crop had already been harvested. There was only one mill in the area,



and as a result large quantities of seed were being moved to other mills in south Texas. After the first specimen was found no seed was allowed to leave the valley until mills which desired to continue receiving seed had installed sterilizers so that seed could be heated immediately upon arrival to 155° F. The lint was compressed at the two plants in the area or allowed to move to designated plants at Corpus Christi for treatment. All persons and firms cooperated wholeheartedly in carrying out the above treatments even though regulations were not in effect when they were first begun.

The 1937 crop was handled under a different plan than had ever been used before. Instead of requiring each gin to install a sterilizer large central plants were built at various points in the area and all seed for milling purposes was heated to 155° F., after which it was allowed movement to any point. Seed for planting purposes was stored in approved places until after the ginning season was completed and was then sterilized by the State. A simple permit system was used whereby we had knowledge at all times of the amount of unsterilized seed remaining in the district and the person who had the seed. Lint was either treated in the area or allowed movement to designated plants at Corpus Christi.

Gin-trash inspection of the 1937 crop was begun on July 7, but it was not until July 22 that a specimen was found at Brownsville, with additional findings being made later at that point and also at San Benito. In order to check on any possible build-up of infestation throughout the season the work in Cameron County was divided into two periods. During the first period, July 7 to 31, 422 bushels of trash were inspected and 10 pink bollworm larvae found. During the second period, on August 20 and 21, 73 bushels of trash were inspected and 12 larvae found, indicating that there had been some increase. In addition to these findings in Cameron County 1 specimen was found at Alamo in Hidalgo County on August 6, but results were negative in Starr and Willacy Counties.

On the Mexican side gin-trash inspection was carried on from July 20 to 28, with specimens being found daily. From 287 bushels of trash inspected 338 specimens were taken, with findings becoming heavier during the last few days of work. On August 18 and 19, 60 bushels of trash were inspected at Matamoros and 322 specimens found. This is at the rate of almost  $5\frac{1}{2}$  worms per bushel as compared with 1.17 worms per bushel in July. Inspections at Reynosa were negative.

Due to the mild climate of the area cotton plants are seldom killed by frost but remain alive throughout the winter; thus, under usual conditions, there would be plenty of fruit to maintain the pink bollworm throughout the year. Therefore, regulations were issued by the State providing that cotton stalks were to be destroyed after the harvesting season and not later than October 1. There would thus be no material on which the insect could propagate itself during



a period of some six or seven months. Another point in favor of this plan is that it is undoubtedly of considerable advantage in reducing boll weevil carryover. Some 295,000 acres were planted to cotton in the 1937 crop. On the whole very good cooperation was received from farmers and others in connection with the stalk destruction program. One of the biggest difficulties is the fact that considerable land is owned by nonresidents and some of this was farmed by squatters. Due to the untiring efforts of the inspectors in the area and excellent cooperation from influential citizens, stalks were destroyed on all but a small part of the acreage. The same program was carried out on the Mexican side. The program was very thorough in areas where infestation was found.

Plans for the 1938 crop season have been changed somewhat. The State has announced that it is financially unable to sterilize planting seed, and regulations have been issued by the State which places the responsibility for seed sterilization upon the ginners. Each gin will not be required to install a sterilizer but must make some arrangement for having seed sterilized. The central plants will again be operated. Indications are that some few gins will install individual sterilizers, but most of them will probably operate on a community plan; that is, one sterilizer for two or more gins. The stalk destruction program will again be followed. Various reports indicate that the stalk destruction program did prove of some benefit in connection with the boll weevil, as there was not the usual amount of early damage by this insect.

### Big Bend

The cleaning of cotton fields of the 1935 crop was begun on November 1. In a few fields the infestation was heavy, and there were heavily infested spots in other fields. Therefore an effort was made to clean such places early in the season before many larvae might go into the ground for hibernation. This effort was only partially successful, as a good top crop was made and farmers naturally wanted to pick all the cotton they could. The stalks were cut with machetes as in the past, but especially constructed hand rakes were used for getting up the debris in lieu of hand-picking. The rakes proved much more economical and efficient. Many fallen squares, blooms and immature bolls, which oftentimes contained pink bollworm larvae, were collected, whereas by hand-picking laborers would gather only the bolls and locks in which they could see open cotton. All fields from the mouth of the Conchos River southward some 20 miles to the mouth of Alamita Creek were cleaned. Above the mouth of the Conchos very little cotton was produced because of a water shortage, but fields in this section were cleaned if the worm population justified it. The small acreage at Castolon was also cleaned. The clean-up was completed on January 23, 1936, a total of 2,262 acres having been cleaned. Part of the labor expense this year was borne by the State of Texas insofar as their



funds would permit. Following the field clean-up a house-to-house canvass was made.

As the control program has been in effect a number of years the worm population was being reduced. Some dissatisfaction was developing over the delayed planting date of April 15, and in the spring of 1936 two fields were planted before this date. The reduction in infestation was also resulting in a better top crop being produced. Farmers naturally wanted to harvest this and as a rule fields were not ready for cleaning in the fall before worms began going into the ground to hibernate. In the fall of 1936 farmers made very little effort to get their fields ready for cleaning, and indicated that they were going to plant cotton the following spring before April 15; therefore, the control program was abandoned in the fall of 1936 and no fields were cleaned in Presidio County. In Brewster County the small acreage is all controlled by one man who has been cooperating fully with the program, and a thorough field cleaning was made.

In Brewster County no cotton was planted in the spring of 1937 until after April 15. In Presidio County the first cotton was planted on March 17, and plantings were continued until May 26. Due to the mild winter considerable stub cotton came up and by the middle of May specimens of the pink bollworm could be found in small squares on the stub cotton. A very heavy infestation developed in Presidio County and considerable commercial damage was done. Estimates made by various farmers ran all the way from 25 to 75 per cent, and undoubtedly the average damage would be at least 40 per cent. Farmers were thoroughly convinced that they had made a mistake in not cooperating and requested that the program be resumed.

Early in 1938 the Texas Pink Bollworm Commission held a hearing at Marfa to consider what steps should be taken with reference to the heavy infestation in the Big Bend. As a result a 2-year plan of control was submitted, and this has been agreed to by the Federal and State Departments, and the farmers in the area have promised wholehearted cooperation. Briefly, this plan is that all cotton in the fall of 1938 be picked and ginned as promptly as possible; that prior to October 1 all cotton stalks be cut and piled while still green (the stalks to be piled the same day they are cut) and the piles burned as soon as the stalks are sufficiently dry; all storage places for cotton or cotton products are to be thoroughly cleaned; in the spring of 1939 no cotton is to be planted prior to May 1.

More stub cotton than ever has developed during the spring of 1938. A considerable part of it has been destroyed during the cultivation of crops, but there is still some abandoned acreage on which the stub cotton was growing and fruiting rapidly on the first of June. Specimens of the pink bollworm could readily be found on the fruiting stub cotton; therefore, indications are that there will be a heavy infestation this



coming fall; but, in view of past experience, if the proposed program is observed, the infestation should be materially reduced during the next two years.

### Pecos Valley of Texas

For the past few years only enough inspection has been done to obtain information as to the status of infestation each year. In the 1935 crop 20 specimens were found in the 78 bushels of trash inspected, while in the 1936 crop 22 specimens were found in 10 bushels of trash inspected. In the 1937 crop there was quite an increase in the number of worms found, 507 specimens being taken from  $4\frac{1}{2}$  bushels of trash in Reeves County, 11 specimens from 2 bushels in Pecos County and 30 specimens from 1 bushel in Ward County. It will be necessary to have the results from several more crops before determining whether the infestation is building up or whether the increase is due to seasonal fluctuation. Regulatory measures to control and prevent the spread of infestation have been continued.

### El Paso and Mesilla Valleys

No systematic inspections have been carried on in this area, however, infestation has been established each year by miscellaneous examinations of trash at gins by hand and by inspection of green-boll samples. There has not been very much change in the number of specimens found each year. Regulatory measures have been continued.

### Pecos Valley of New Mexico

A small amount of inspection has been carried on in this area each season merely to determine that infestation was still present. In the 1937 crop only 1 specimen was found in Chaves County, however, in Eddy County there was quite an increase in the number of specimens found, 101 being taken from 33 bushels of trash. Incidental inspections of gin trash by hand showed that worms could be very easily found in trash from certain fields, and one farmer near Malaga reported that there was noticeable damage in his field. As in the case of the Pecos Valley of Texas, it will take several seasons to definitely establish whether or not the infestation is building up. Regulatory measures have been continued.

### Southeastern Arizona and Southwestern New Mexico

There has been very little change in infestation in southeastern Arizona. The results of the 1937 crop inspection indicate that there was perhaps a decrease. In southwestern New Mexico the cotton acreage was increased considerably during the 1937 crop and a new gin erected at Deming. This made it possible to carry on gin-trash inspection and obtain definite information as to the degree of infestation. A general infestation was found to be present in the main cotton-growing area



and also in isolated fields. Inasmuch as the acreage has been very small during previous seasons it is impossible to make any comparison with previous infestations, as the small amount of cotton produced was carried to another area for ginning and it was very hard to obtain samples of trash for inspection. Regulatory measures have been continued.

### Texas Panhandle

This area was formerly known as the Western Extension. Due to the fact that the infestation now covers a much larger area than the original infestation, it was thought that "Texas Panhandle" would be a more appropriate name. The district includes the counties of Lea and Roosevelt in New Mexico and Andrews, Cochran, Dawson, Ector, Gaines, Glasscock, Hockley, Howard, Martin, Midland, Terry, Yoakum and parts of Bailey and Lamb Counties in Texas. Headquarters are maintained at Lubbock, Texas.

No infestation was found during the 1935 crop season, but during the 1936 season infestation was established at three different points with 9 specimens being found, indicating that a very light infestation still existed. During the 1937 season a tremendous crop was produced and intensive gin-trash inspection was carried on under very favorable conditions. Specimens of the pink bollworm were found in Andrews, Cochran, Dawson, Gaines, Martin and Terry Counties. Only 28 specimens were found, indicating that infestation is still very light. Because of the very light infestation and severe winters, regulatory measures enforced have been modified somewhat as will be noted in the section covering Quar. 52.

### Maricopa and Pinal Counties

In this area, known as the Salt River Valley of Arizona, an infestation was eradicated several years ago and the area released from quarantine restrictions on December 23, 1933. In each succeeding crop thorough gin-trash inspections have been carried on to determine that there was no recurrence of infestation. There never has been in Maricopa County. During the 1937 crop season 1 specimen of the pink bollworm was found at Casa Grande in Pinal County. Inasmuch as over 4500 bushels of trash were inspected in this county the finding indicates that the infestation is extremely light. This inspection was in the main cotton-producing section of the county. In the eastern part of the county there is a small isolated acreage near Feldman. The cotton was ginned in Pima County, and 4 specimens, which apparently originated near Feldman, were found during the course of inspection in Pima County. The regulations were revised on January 3, 1938, to add the above portions of Pinal County to the regulated area and they were designated as lightly infested.



## Pima County

The last pink bollworm infestation in this county prior to that of the 1937 crop was found in the 1930 crop. Inspections were carried on each season during the period 1931 to 1936 with negative results. During the 1937 season inspection infestation was again found in Pima County and also in some cotton which is grown in Santa Cruz County but ginned in Pima County. The infestation extended from Rillito, some 17 miles north of Tucson, southward into Santa Cruz County as far as cotton is grown. The main cotton area is in the Marana section, but no indication of infestation was found there. Pima County has been regulated under Quarantine 61 since July 15, 1926, and the regulatory measures carried out have been practically the same as those for the pink bollworm; however, under the revision of regulations on January 3, 1938, Santa Cruz County and a portion of Pima County were added to the area regulated on account of the pink bollworm. They are designated as lightly infested.

The only satisfactory explanation for the spread of infestation in southern Arizona is that moths were brought in by favorable wind currents from infested areas to the east or south. Assuming that this was true, it became important to determine whether or not *Thurberia* plants growing in the various mountain ranges of southern Arizona were infested with the pink bollworm. Therefore, some 30,000 *Thurberia* bolls were inspected early in 1938 from the various ranges and 1 specimen of the pink bollworm was found in bolls which had been collected in the Rincon Mountains east of Tucson. After this finding additional bolls were collected and over 88,000 were inspected without finding any further specimens of the pink bollworm.

## Georgia

The first and only infestation in Georgia was in the 1933 crop. Intensive inspections were made during the 1934 and 1935 crop seasons with negative results, and as two crop seasons had elapsed since the original infestation, the area was released from quarantine restrictions on December 5, 1935. Thorough inspections were made during the 1936 and 1937 crop seasons, also with negative results.

## Florida

The last infestation of domestic cotton in this state was in the 1934 crop. Results were negative during intensive inspections made during the 1935 and 1936 crop season, and the area was released from quarantine restrictions on October 14, 1936. Thorough inspections have been made during the 1937 crop season with negative results.

The wild-cotton eradication program has been continued, with work being carried on in 1935 from the middle of November until the latter part of the following June. As a result of securing WPA funds a more thorough and far-reaching program was carried out than in any previous season. Larger crews were used, which made it possible to cover the territory more thoroughly and also cover large areas not



previously entered. A large number of bolls were inspected as plants were being destroyed, and specimens of the pink bollworm were found on several small keys off the coast of Monroe and Dade Counties.

In 1936, 5 small crews began work on the west coast in August, the object being to remove seedling plants which would have fruited before regular work got under way in the fall. The regular work began about the first of November, and some WPA funds were again used. An important phase of the work was a survey made with an autogiro during March and April of 1937, the plane being loaned by the Dutch elm disease project. An area of some 1900 square miles was covered, and a few new locations capable of sustaining wild cotton were located. Of equal importance was the fact that many hundred square miles of swamps and everglades were found to be unsuitable for wild-cotton growth and were thus eliminated from any further consideration in the eradication program.

In 1937 work was begun the latter part of October and discontinued in June. This season has been especially dry, so that many low places could be entered without any trouble, and practically no time has been lost. All of the wild-cotton area has been recleaned at least twice this season, and colonies on the upper west coast have been recleaned three times.

The territory in southern Florida capable of sustaining wild cotton has been thoroughly covered, and it is believed that all virgin plants have been located and removed. For the past two seasons no bolls have been allowed to open and shatter seed on the ground. The program hereafter will therefore consist of recleaning known locations each season before plants have produced mature fruit. There has been a considerable reduction in the number of seedling plants removed this season as compared with last season, indicating that progress is being made toward final eradication. A few specimens of the pink bollworm were found this season in extreme southern Florida. In the upper west coast counties, which are nearest cultivated cotton, no infestation has been found since 1932.

#### Investigations in Mexico

Inspections have been made each season in cotton-growing areas of Mexico near the border. As a result it has been determined that infestation still exists in the Matamoros, Ojinaga and Juarez Valley sections. No infestation has ever been found in the important cotton-growing area of the Don Martin Project nor in Lower California.

#### Thurberia Weevil

Gin-trash inspection is carried on each season to obtain some idea as to the status of infestation by the Thurberia weevil. As a



result 30 *Thurberia* weevils were found in the 1935 crop, 25 in the 1936 crop and 35 in the 1937 crop. It will thus be seen that there has been only a slight variation each season, and no commercial damage has ever been done.

Infested *Thurberia* plants in mountain ranges furnish a continuous source of reinfestation to nearby cultivated cotton. In 1935 emergency relief funds were provided by the WPA to attempt eradication of the plants and thus remove the menace from cultivated cotton. In August 1935 work was begun in the Tortillita Range, which is nearest cultivated cotton, and was completed in 1936. A total of 64,680 acres were covered and 59,283 *Thurberia* plants were destroyed. Work was then begun in the Santa Catalina Range, which is next nearest the cultivated cotton. At the beginning laborers were transported to and from Tucson each day, but as soon as all of the area readily accessible from Tucson had been worked a camp was set up in the mountains. It has had to be moved a number of times as various sections were completed. In the Santa Catalina Range 121,645 acres had been covered to June 1, 1938 and 1,217,290 *Thurberia* plants destroyed. Many of these have been very heavily infested with the *Thurberia* weevil.

Mention was made in the discussion under Pima County of the inspection of over 88,000 *Thurberia* bolls to determine whether or not they were infested with the pink bollworm. During this inspection a record was kept and 17,862 *Thurberia* weevils were found. Bolls from each range where collections were made were infested, ranging from about 6 per cent to as high as 33 per cent.

### Scouting

Inspections made within regulated areas have been discussed under each area; therefore, this discussion covers the work outside regulated areas. Most of the inspection is carried on in sections adjacent to regulated areas and other places which are exposed to infestation. During the 1935 season very intensive inspections were made in southern Alabama, southern Georgia, west and southwest Texas and the Salt River Valley of Arizona. A considerable amount of inspection was also carried on in Louisiana, Mississippi and the states of Nuevo Leon and Tamaulipas in Mexico. No specimens of the pink bollworm were found in the above area.

During the 1936 crop season intensive inspections were again carried on in southern Alabama and southern Georgia; also in west and southwest Texas and the Salt River Valley of Arizona. Gin-trash inspections were also made in California, with a lesser amount being made in Arkansas, Louisiana, Mississippi and Tennessee. The results were all negative. A considerable amount of inspection was also done in the states of Nuevo Leon and Tamaulipas and Baja, California, in Mexico.



Specimens of the pink bollworm were found in Tamaulipas in the Matamoros section, but results were negative in the other states mentioned.

During the 1937 crop season intensive inspections were made in northern Florida, southern Georgia, southern Alabama, southwestern Oklahoma, the Salt River Valley of Arizona, south Texas and northwest Texas. Some work was also done in South Carolina. A considerable amount of material was inspected in the state of Nuevo Leon, Mexico, and a lesser amount in the state of Tamaulipas. Specimens of the pink bollworm were again found in Tamaulipas, but results in the other area were negative.

#### Clean-up

In connection with the eradication program in the Big Bend of Texas, field clean-up was again carried on during the 1935 crop season. A total of 2,262 acres was cleaned at an average cost of \$3.56 per acre. Part of the labor expense was borne by the Texas State Department of Agriculture insofar as their funds would permit.

No field clean-up has been carried on in any area since the 1935 crop season. A stalk-destruction program was carried on during the 1937 season in the lower Rio Grande Valley of Texas, however, this was done by the farmers themselves and involved no cost to this project.

#### Road-Traffic Inspection

The road-inspection station at Marfa, Tex. has been maintained each year during the cotton-harvesting season. Inasmuch as the large majority of traffic passing this station is local, the travelers have become familiar with our regulations and have been cooperating by making an effort to see that their cars and trucks are free of contraband products before leaving the Big Bend section. Even so, small amounts of cotton products infested with the pink bollworm have been intercepted each season. In 1935, 336 living pink bollworm larvae were intercepted, 123 living larvae in 1936 and 75 living larvae in 1937. Since the discovery of infestation in the lower Rio Grande Valley of Texas, a road-inspection station is being operated near Falfurrias during the cotton-harvesting season. A large amount of contraband material has been intercepted, none of which has ever been found to be infested with the pink bollworm.

#### Pink Bollworm Quarantine No. 52

The pink bollworm quarantine and regulations were revised, effective December 5, 1935, in order to release from restriction all parts of the State of Georgia formerly included in the regulated area. No other changes were made.



On March 1, 1936, Administrative Instructions (B.E.P.Q.--338) were issued approving alternate treatments for baled cotton lint from heavily infested areas. These were steam sterilization and roller treatment.

On April 13, 1936, Administrative Instructions (B.E.P.Q.--393) were issued removing the treatment requirements on baled lint and linters and products thereof produced from sterilized cottonseed from the regulated area in Florida.

On August 17, 1936, Regulation 3, of Quarantine 52, was revised, (Amendment 1) to bring under regulation the counties of Cameron, Hidalgo, Starr and Willacy in Texas. They were designated as lightly infested.

On April 28, 1936, Administrative Instructions (B.E.P.Q.--414) were issued removing the treatment requirements on baled lint and linters and products thereof from Lea and Roosevelt Counties in New Mexico and Andrews, Cochran, Ector, Gaines, Hockley, Terry, Yoakum and the regulated parts of Bailey, Dawson, Lamb and Midland Counties in Texas.

On October 14, 1936, Quarantine No. 52 was revised in order to release from restriction all parts of the State of Florida formerly included in the regulated area.

On December 1, 1936, Regulation 3 was revised (Amendment No. 1) in order to add the counties of Glasscock, Howard and Martin, and those portions of Dawson and Midland Counties in Texas not previously regulated, to the lightly infested area.

On April 6, 1937, Regulation 3 was revised (Amendment No. 2) in order to add Sierra County, N. Mex. and the counties of Crane, Loving, Upton and Winkler in Texas, to the lightly infested area. This revision was principally for the purpose of allowing the movement of seed to farms and ranches for planting and feeding purposes.

On May 27, 1937, Administrative Instructions (B.E.P.Q.--414) was revised in order to include the counties of Dawson, Midland, Glasscock, Howard and Martin, which had been added to the regulated area since the original instructions were issued.

On May 27, 1937, Administrative Instructions (B.E.P.Q.--450) were issued approving alternate treatment for the movement of baled cotton linters ginned from cottonseed produced in lightly infested areas. This treatment provides for the movement of linters when produced from seed heated to a temperature of at least 155° F., separate and apart from ginning operations.

On July 27, 1937, Administrative Instructions (B.E.P.Q.--459) were issued approving alternate treatments for the movement of cottonseed



from lightly infested areas. These treatments are: heating to a temperature of 145° F. for a period of 30 minutes or heating to a temperature of 155° F. separate and apart from ginning operations.

On October 28, 1937, Regulation 3 was revised (Amendment No. 3) to add the counties of Socorro and Valencia, N. Mex. to the lightly infested areas. There is only a small amount of cotton grown in them, and the revision is principally to allow the return of seed to farms and ranches for planting and feeding purposes.

On January 3, 1938, Regulation 3 was revised (Amendment No. 4) to add Santa Cruz and portions of Pima and Pinal Counties in Arizona to the lightly infested area.

#### Thurberia Weevil Quarantine No. 61

On October 22, 1936, Regulation 3 was revised (Amendment No. 1) to release four townships in Pinal County from the regulated area. The released area is desert land on which no cotton has heretofore been grown, but plans are under way for irrigation and cotton production.

On April 1, 1937, Administrative Instructions (B.E.P.Q.--436) were issued approving alternate treatment for the movement of cottonseed. This treatment is sterilization to 145° F. as a part of the continuous process of ginning and, in addition, treated by sulphuric acid and screened.

On July 27, 1937, Administrative Instructions (B.E.P.Q.--436) were revised approving additional alternate treatments for the movement of cottonseed. The treatments are sterilization to 145° F. as a part of the continuous process of ginning and, in addition, treated with sulphuric acid and screened; or special heat treatment at 145° F. for a period of 30 minutes; or heated to a temperature of 155° F. separate and apart from ginning operations.